

Magnetic Disturbance

THERE was a considerable disturbance of the magnetograph recorded here on March 15, and had the photographic curves been developed on that day, we should probably have predicted the occurrence of the aurora seen during the evening. The earth-currents, which are necessary concomitants of magnetic disturbances, were probably intense enough to cause the disarrangement of the cable tests referred to by Mr. Willoughby Smith.

G. M. WHIPPLE

Kew Observatory, Richmond, Surrey, April 7

The Samsams

FROM a note in last week's NATURE it appears that during his recent explorations in the Malay peninsula M. Delouell claims to have discovered the "hitherto unknown" Samsam people. Allow me to state in reply that I have long been aware of the existence of these half-caste Malay and Siamese communities. They will be found duly recorded and described at p. 642 of my ethnological appendix to the "Australasia" of the Stanford Series, published in 1879. They appear to be now mostly Mohammedans, speaking what is called a mixed Siamese and Malay dialect, and otherwise forming an ethnical transition between these two races.

A. H. KEANE

University College, Gower Street, April 4

Meteor

LAST evening (April 3) I saw a fine meteor at 8h. 21m. G.M.T. ($\pm 1m$). I was walking along the street at the time and looking at Algol, and so only caught sight of it during the last few moments of its apparition. Its path as observed was from $\alpha 80^\circ$ North $\delta 2^\circ$ to $\alpha 76^\circ$ South $\delta 4^\circ$, when it disappeared behind houses. It seemed quite twice the brightness of Jupiter, and about 3' diameter; colour, chrome yellow; duration, three seconds. It left no visible train.

H. SADLER

Clapham, April 4

STEEL GUNS¹

THE whole of this part of the Proceedings of the Naval Institute is occupied by detailed accounts of the steps taken to prepare the way for the establishment of Steel Gun Factories for the United States. We are informed that, while the rest of the world has advanced with the progress of the age, the artillery of the United States has made no step forward. Artillerists and advocates for providing adequate means of defence have laboured under many difficulties during the last twenty years, while regret is expressed that personal interests have entered so largely into the discussion of a question of such magnitude. In the House of Representatives it was declared that the fortifications of that country were in an absolutely worthless condition for all purposes of warfare.

Early in 1882 communications were opened with the owners of the chief foundries and steel works of the United States, but no firm could be found which had ever made steel guns.

At length the President of the United States was authorised and required to select six officers of their army and navy to examine and report respecting the necessary navy-yards and arsenals. Accordingly, the President named six officers (April 2nd, 1883) to form the Board of Gun Foundry, and one of their number, Lieut. W. H. Jaques, U.S.N., was elected secretary to the board. Their report was dated February 16th, 1884. The Board found it necessary to seek information in Europe, and make visits to England, France, and Russia, in order that they might reply satisfactorily to the Act of Congress. There they were well received, and had every facility afforded them in making their inquiries. The aim of Lieut. Jaques, U.S.N., in his communication to the Naval Institute, was

¹ Proceedings of the United States Naval Institute, vol. x. No. 4, 1884. (The Establishment of Steel Gun Factories in the United States, by Lieut. W. H. Jaques, U.S.N.)

to show the necessity of steel gun factories to the United States, to extend the information collected, and to provide a book of easy reference to the details of modern ordnance. He has produced a work which ought to warn and instruct us.

The Board in their Report give an account of the introduction of the coil system of building up guns in England; of the cost of the system to this nation; of the forty-pounder Armstrong, adopted for the navy in 1859, and of the constructing of one hundred of the 110-pounders before any experiments with them had been concluded.

Of four guns under trial, three showed a separation on the outside between the trunnion-ring and the coil behind it. The fourth showed a separation all round, but to less extent. All the guns expanded in the shot chamber and part of the powder chamber, and the bores were elongated. Much of these defects, no doubt, arose from excessive friction between the lead-coated projectile and the gun, which caused an unnecessary stress upon the gun.

The first visit paid by the Board was to the Elswick works. They remark: "The establishment at Elswick is thoroughly equipped for heavy work, and has produced the largest guns in the world. . . . The shops are supplied with an abundance of fine tools," page 583. They have a hammer of thirty-five tons. "The advantages of the Whitworth manufacture are also recognised, and a forging press is being introduced."

They next visited the Woolwich Royal Gun Factories, which are stated to have had in 1873-4 a capacity for the production of 6,000 tons of guns of various calibres per year. "The transition state in which the Board found the Woolwich gun factories is due to the change from muzzle-loading to breech-loading, and the substitution of homogeneous metal for the wrought coil" (page 589). The Board give a list of the chief tools in the Arsenal, as boring machines, planing machines, &c. There are four travelling cranes of 60 tons, six of 30, and six of 25 tons capacity. There are also: one steam hammer of 40 tons, one of 12 tons, one of 10 tons, two of 7 tons, besides many smaller ones. The steam power in the Royal Gun Factories is supplied by forty boilers of 40-horse power. "The plant at Woolwich, because of its transition state, contains very little worthy of imitation in planning the erection of gun factories in the United States."

The Board next visited the works of T. Frith & Sons, Sir John Brown & Co., C. Cammell & Co., and Sir H. Bessemer, all of Sheffield, and Lieut. Jaques gives full accounts of the most recent furnaces and methods employed there in working steel, illustrated with many beautiful plates. He also gives an account of the manufacture of compound armour, under the patents of Wilson & Ellis; as well as of the trials of armour plate made at Spezzia, and of granite forts protected by iron plates at Shoeburyness in 1883.

"The new departure in the system of gun construction, described farther on in this report, will demand from the Sheffield steel manufacturers increased effort. Up to the present time the only portion in the construction of the Woolwich gun that required steel was the tube. . . . The new construction requires that steel shall be used throughout, and the castings for the jackets for guns now in hand at Woolwich can hardly be supplied from Sheffield" (page 630).

It is remarked that in one important establishment preparations were being made for the introduction of a large press, to take the place, or supplement, the work of the hammer. The Sheffield steel manufacturers are entirely sceptical as to the advantage or practicability of the compression of steel in the liquid state, and although they concede the efficacy of forging under hydraulic compression, they consider it an objection to the process that a much higher temperature will be required for the press than for the hammer.

Sir Joseph Whitworth's works at Manchester were